A pair of Army soldiers use the INL-developed Hazmat Cam to relay radiation readings from an incident scene to a command post.

Hazmat Cam

A real-time wireless video system for CBRNE incident response teams

Engineers at Idaho National Laboratory are well-known for their ability to solve complex nuclear, environmental and national security challenges through the development and deployment of unique technology.

When the U.S. Army National Guard approached INL engineers with the need to more quickly relay crucial information to command posts from chemical, biological or radiological contamination zones, the result was an award-winning lightweight, wireless video camera system that transmits encrypted video up to five miles away. Today, this situational awareness technology is known as the Hazmat Cam, and is used by more than 35 military units, fire departments and urban search-and-rescue teams across the country. It is commercially available from Baltimore-based View Systems, Inc. and is marketed as the Visual First Responder.

The Hazmat Cam was designed for flexibility and includes unique features such as the capability to transmit and record video streams across multiple platforms and a fully submergible waterproof housing for easy decontamination.

Additionally, each Hazmat Cam includes a three-antenna, true-diversity receiver that minimizes signal distortion in urban environments. Traditional wireless video uses one antenna and a single receiver. The problem with this configuration is that signals multipath – bouncing off other structures, buildings, and even people – on their way to the receiver. This causes interference and seriously degrades the video images. Since users of any handheld wireless camera are constantly moving, the problem is compounded.

But the Hazmat Cam receiver seeks the strongest signal from each of the three antennas and locks in this signal. It completes this scan over 1,000 times per second, much faster than a human viewer would notice. This triple-diversity receiver results in

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a clear, more reliable image even under less-than-perfect conditions, such as within metal buildings or concrete tunnels. In fact, the Hazmat Cam has even successfully transmitted video from inside a 150-foot, three-deck steel fishing ship.

Before the development of the Hazmat Cam, information exchanged between trained emergency responders inside a hazardous area and the incident commander and technical experts outside the hazardous area was typically limited to verbal communication via two-way radios. Describing a complex hazard scene took a lot of valuable time and the initial entry team occasionally missed relaying important facts about the scene.

With the affordable Hazmat Cam, this process is improved, and responder safety increases because response time is reduced and incident commanders and decision makers outside the exclusion zone are able to see in real time what the entry team sees while performing initial reconnaissance of a facility or structure. The system also eliminates the need for repeat entries because the footage can be displayed on most types of video monitors, or on the system's own color LCD monitor. The feed can also be easily recorded or transmitted over the Internet to support agencies.

Technical experts review real-time video footage from the Hazmat Cam at a command post located miles from the incident scene.

In addition, the system has other distinguishing features, including the Extension Link, which is a separate transmitter-and-receiver system that increases the wireless operating range of the Hazmat Cam from 2,000 feet up to five miles.

The complete Hazmat Cam system with Extension Link is stored in four cases weighing less than 150 pounds, and can be fully deployed by one person in a stand-alone configuration in less than 10 minutes. The system is completely battery operated and can operate for five continuous hours by using one spare camera battery pack.

The Hazmat Cam has become indispensible to a variety of emergency responders, such as rescue workers, emergency managers, firemen and hazmat workers.

For more information

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